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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,375	09/28/2001	Jong-Seo Choi	P56533	2237
7590	05/30/2003		EXAMINER	
Robert E. Bushnell Suite 300 1522 K Street, N.W. Washington, DC 20005			QUARTERMAN, KEVIN J	
			ART UNIT	PAPER NUMBER
			2879	

DATE MAILED: 05/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	09/964,375	CHOI ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Kevin Quarterman	2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 28 September 2001 .

2a)  This action is **FINAL**.                    2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4)  Claim(s) 1-34 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5)  Claim(s) \_\_\_\_\_ is/are allowed.

6)  Claim(s) 1-34 is/are rejected.

7)  Claim(s) \_\_\_\_\_ is/are objected to.

8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on 28 September 2001 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)  The proposed drawing correction filed on \_\_\_\_\_ is: a)  approved b)  disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.

12)  The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

14)  Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a)  The translation of the foreign language provisional application has been received.

15)  Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)      4)  Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_ .  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)      5)  Notice of Informal Patent Application (PTO-152)  
3)  Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.      6)  Other: \_\_\_\_\_ .

## DETAILED ACTION

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. The following title is suggested: --CATHODE FOR ELECTRON TUBE HAVING NEEDLE-SHAPED CONDUCTIVE MATERIAL AND METHOD OF PREPARING THE CATHODE--.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-3, 8-13, 18-19, 23-25, and 30-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Koizumi (US 5216320).
5. Regarding independent claims 1 and 23, Figure 1 of Koizumi shows a cathode for an electron tube comprising a metal base (2) and an electron-emitting material layer (3) coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (col. 2, ln. 63).

6. Regarding claims 2, 12, and 24, Koizumi discloses the needle-shaped conductive material being at least one material selected from the group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum (col. 2, ln. 62).

7. Regarding claims 3, 13, and 25, Koizumi discloses the needle-shaped conductive material being a carbonaceous material (col. 2, ln. 62).

8. Regarding claims 8-9, 18-19, and 30-31, the method of forming the device is not germane to the issue of patentability of the device itself. Therefore, the limitation of the electron-emitting material layer being coated on the metal base by a method selected from the group consisting essentially of printing, electrodeposition, and painting has not been given patentable weight.

9. Regarding independent claim 10, Koizumi discloses the limitations of independent claim 1, as discussed earlier. Figure 1 of Koizumi also shows a surface roughness corresponding to a distance between the highest point and the lowest point on the surface of the electron-emitting material layer being less than 10 microns.

10. Regarding claim 11, Koizumi discloses the cathode being an oxide cathode (Abstract).

11. Claims 1-5, 8-10, 12-15, 18-19, 23-27, and 30-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Uemura (US 6239547).

12. Regarding independent claims 1 and 23, Figure 9B of Uemura shows a cathode for an electron tube comprising a metal base (905) and an electron-emitting material

layer (903) coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (col. 2, ln. 53).

13. Regarding claims 2, 12, and 24, Uemura discloses the needle-shaped conductive material being at least one selected from the group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum (col. 2, ln. 48-53).

14. Regarding claims 3, 13, and 25, Uemura discloses the needle-shaped conductive material being a carbonaceous material (col. 2, ln. 48-53).

15. Regarding claims 4, 14, and 26, Uemura discloses the carbonaceous material being selected from the group consisting essentially of a carbon nanotube, carbon fiber, and graphite fiber (col. 2, ln. 48-53).

16. Regarding claims 5, 15, and 27, Uemura discloses the carbonaceous material being a carbon nanotube (col. 2, ln. 48-53).

17. Regarding claims 8-9, 18-19, and 30-31, the method of forming the device is not germane to the issue of patentability of the device itself. Therefore, the limitation of the electron-emitting material layer being coated on the metal base by a method selected from the group consisting essentially of printing, electrodeposition, and painting has not been given patentable weight.

18. Regarding independent claim 10, Uemura discloses the limitations of independent claim 1, as discussed earlier. Figure 9B of Uemura also shows a surface roughness corresponding to a distance between the highest point and the lowest point on the surface of the electron-emitting material layer being less than 10 microns.

***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 6-7, 16-17, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koizumi and Uemura, as applied to claims 1 and 11.

21. Regarding claims 6, 16, and 28, Koizumi and Uemura disclose the claimed features of the invention, as described earlier, but fails to exemplify the needle-shaped conductive material in the electron-emitting material layer being in the range of 0.01 to 30% by weight based on the total weight of the electron-emitting material. Regarding claims 7, 17, and 29, Koizumi and Uemura also fail to exemplify the thickness of the electron-emitting material layer being in the range of 30 to 80 $\mu$ m.

22. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the electron-emitting material layer of Koizumi and Uemura with the above mentioned amount of conductive material and the above mentioned thickness, since where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

23. Claims 20-22 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koizumi in view of Ando (US 4349766).

24. Koizumi discloses the limitations of claims 11 and 23, as discussed earlier. Koizumi fails to exemplify, regarding claims 20 and 32, a metal layer including nickel grains having sizes smaller than the grains in the metal base, the metal layer formed between the metal base and the electron-emitting material layer. Koizumi also fails to exemplify, regarding claim 21 and 33, the metal layer further including at least one metal selected from the group consisting essentially of aluminum, tungsten, tantalum, chromium, magnesium, silicon, and zirconium. Koizumi also fails to exemplify, regarding claims 22 and 34, the thickness of the metal layer being in the range of 1 to 30 $\mu$ m.

25. Figure 1 of Ando teaches that it is known in the art to provide cathodes for an electron tube with a metal layer (2) including nickel grains having sizes smaller than the grains in the metal base layer (5), the metal layer formed between the metal base and the electron-emitting material layer (3). Ando also discloses that the metal layer further includes tungsten (col. 3, ln. 26). Ando also discloses that this metal layer is provided in the cathode structure for firmly fixing the electron-emitting layer to the base metal (col. 3, ln. 16-19).

26. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode structure of Koizumi with the metal layer formed between the metal and the electron-emitting material layer, as taught by Ando, for improving the cathode structure.

***Conclusion***

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Misumi (US 4279784) discloses thermionic emission cathodes. Ando (US 4220891) discloses directly heated cathode for electron tube. Koizumi (US 6504293) discloses a cathode ray tube having an improved cathode. Lee (US 5055078) discloses a manufacturing method of an oxide cathode.

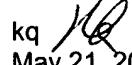
***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (703) 308-6546. The examiner can normally be reached on M-F (8-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Kevin Quarterman  
Examiner  
Art Unit 2879

kq   
May 21, 2003



Vip Patel  
Primary Examiner  
Art Unit 2879